South • Australian • Apple • Users • Club

APPLESAUCE

December 1990 - $2.50

Registered by Australia Post Publication No. SBH0229

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Membership Fees

Individuals or Schools $30.00
Corporations / Businesses $50.00
Extended memberships available

Library Disks

Public Domain disks
Apple][(5.25") $4.00 each
Apple][GS (3.5") $7.00 each
Macintosh $7.00 each
(10 or more $5.00 each)

Boxes of 10 blank disks
3.5" DSDD $23.00
3.5" DSHD $50.00
Disk Catalogues 1990 $2.00 each

Disclaimer

The SAAUC while making every endeavour to ensure Public Domain disks are free of any virus or other fault, no responsibility is accepted for any damage to computer equipment or loss of data which may be caused by these disks or programs. All programs supplied on club disks have been written using original Apple equipment; no guarantee is given by the club for use of programs on Apple compatible computers.

Postal rates for disks

1 to 9 disks add $2.00
10 disks add $3.00
Greater than 10 disks add $4.00
The above rates include Australia Post insurance worth $50.
Please add an additional $2.50 for insurance cover worth $200.

Public domain disk purchases of $20 or more from S.A. country members (Postcodes 5200 or greater) or interstate members will be posted FREE. The additional insurance charge of $2.50 is still payable if you require the extra cover.

Information page

Meetings

Are held on the 1st and 3rd Fridays of each month at the rear of the Prospect Town Hall, Prospect Road, Prospect.

Contributing Articles

Articles will be accepted from anyone wishing to contribute material for publication in the newsletter, provided it is oriented towards Apple computers. It can be of any topic relating to Apple computers, and may be typed printed normally spaced on standard A4 paper, or preferably on disk as a plain text document. Send articles to the Newsletter Editor c/- above postal address or hand to a club committee member at any meetings. All disks will be returned.

Members who contribute an article with a length of two pages or greater will receive their choice of club disk from the library on request.

Advertising

Small advertisements (quarter page or less) from financial club members will be accepted and published free of charge provided they are signed by the person(s) placing the advertisement.

Business advertising rates are by negotiation or as follows:
1/4 page $18.00
1/2 page $30.00
Full page $50.00
Back cover $70.00

All advertisements will be printed under the proviso that they do not conflict with the best interests of the Club.

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Editorial

Bill Wardrop

Note

New Public Domain Disk Prices

Apple][	**$4.00 each**
Apple][GS	**$7.00 each**
Macintosh	**$7.00 each**

See the Disk Catalogue for further details.

Special

At the December Meeting 3.5" Public Domain Disks will be sold for $5.00 each

As you can tell from the front cover, Christmas is almost here again (as if you didn't already know that!). That means that the December meeting is the last one for the year. As in past years a supper will be provided, though perhaps not as lavish as in the past.

That meeting will also be the last in the Prospect Hall as the Council require it for office space. **Watch the February issue for details on where to go for the February meetings.**

At the November General meeting Graham Dicker gave an outstanding presentation on Computer Graphics. He kindly left us his notes, and from them I have been able to compile the article in this issue.

At the Mac meeting Michael Coleman gave a presentation about obtaining simple animation on the Mac. This was most informative, a great presentation.

I wish you all the compliments of the season and look forward to writing for you again in the New Year.

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APPLESAUCE

Presidential Pen

D E C E M B E R 1 9 9 0

Yet another year has passed for the Club. The committee and I would like to extend to all members and their families the compliments of the season. I would personally like to thank all members, particularly the very hard working committee, who have made all our achievements possible this year.

CPM&S have assisted the club both at meetings, and by having our club flyer on display, also supplying it to Customers that have purchased equipment, and by providing a little extra service to our members. Thanks to Kevin, Greg, and Chris and other CPM&S Staff for the support. We have also had support from PC Computers, both at meetings and by service to the membership. Thanks to Graham Dicker and staff.

Last month I received a letter from Lindsay Cook. Lindsay has asked whether any of our members are ProSel or potential ProSel users. I have not heard of this prior to this, but according to a letter received by Lindsay, Charlie's AppleSeeds USA have announced a new User Group Support Program to provide support for Glen Bredon's program ProSel-16, called the ProSel Resource. The purpose of this program is to provide revision software for those who wish to obtain disk upgrades rather than download the revisions, when Glen updates the program. Lindsay is interested in providing the club with some support in the event that we have club members sufficient to justify the cost.

The Xmas meeting is on Friday 7th of December, and will encompass both the normal meeting and Mac Special Interest Group for our end of year get together. After a presentation and a few formalities, we would like you to stay for a light supper.

The committee have again retained the membership fee for next year at $30.00 for personal membership, and $50.00 for corporate membership. **To encourage renewal of your membership, we would ask all present members to take the opportunity of our special $5.00 discount offer during the month of December 90.**

The Club requires a healthier membership base to support the Newsletter publication cost.

Your Committee look forward to seeing you at the December Meeting, come and join our Xmas Party that follows the meeting - see you there.

Regards
Bob Owen

PS. The committee have agreed to accept all renewals of membership, at the discount rate rate of $25.00, providing that it is received during December. (This is still at 1987 prices, so don't miss out!)

Merry Christmas and a Happy, Healthy, and Prosperous New Year to You All.

Diary Dates

Christmas Meeting:
Friday 7th December, 7:30 p.m.

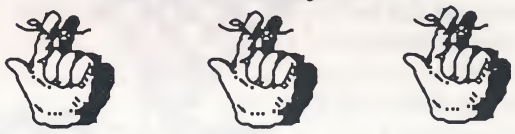
For both Apple II and Mac. members.
This is the only meeting during December

- Bulletin board access - Introduction to Pegasus
  - an on-line demonstration by Geoff Peters.
- Video Overlay Card (IIgs) - David Pettinger & Keith Zerna
- 3.5" PD disks SPECIAL at $5.00 each
- Light supper & drinks provided at the conclusion of the meeting

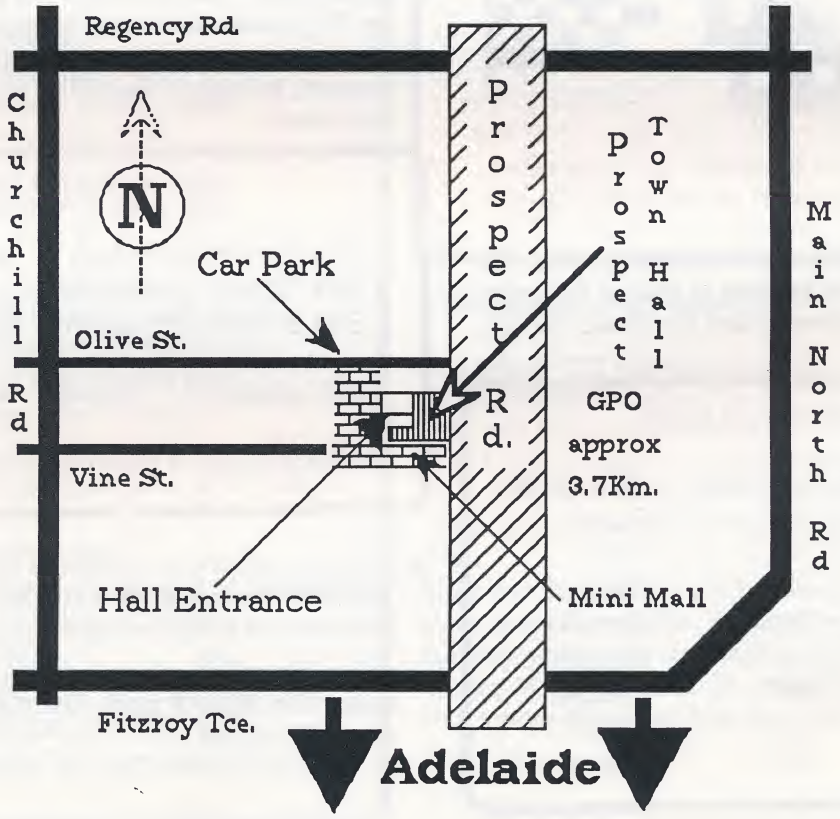
Committee Members ONLY Meeting will be at the Adelaide Airport location on Friday 11th January 1991 at 7.30pm

Newsletter contributions may be submitted to any club committee member on paper or disk. Articles on disk can be copied onto club disks at meetings. All disks will be returned to you as soon as possible.

Deadline for next Apple-sauce
11th January 1991



Last meeting at this venue: watch February AppleSauce for details of the new location



COMPUTER GRAPHICS

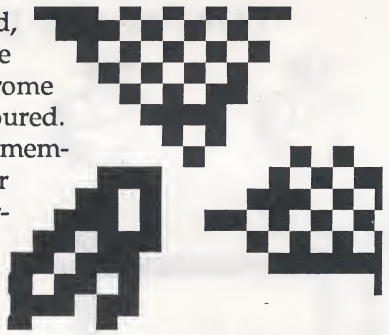
from a presentation by Graham Dicker at the November General Meeting

WHY WE NEED COMPUTER GRAPHICS.

a) Text only systems have been overtaken with the modern requirement to integrate graphics with text.
b) Printer quality text, as used by typesetters, has become the requirement of the day.
c) Dot matrix printers, which are the standard output for computers, lack the style and variety of fonts and point sizes required. The answer is to generate the fonts with graphics.
d) Other graphics applications - games, design, CAD, drawing , artistry.

BASIC GRAPHICS PRINCIPLES.

a) Graphics consist of small elements called pixels. The pixel is the smallest element, and represents a dot, either on the screen or not.
b) Depending on the system used, this pixel can be either monochrome (B & W) or coloured. The amount of memory required for display is determined by the number of bits used for each display pixel.



In monochrome this is usually 1 bit per pixel. This bit is either on or off, as the pixel is displayed or not.
c) In colour different systems are used for pixel display. The larger the number of colours the **greater** the memory requirement and the **slower** the processing time.

Colour combination table

RED	BLUE	GREEN	COLOUR
-	-	-	Black
on	-	-	Red
-	on	-	Blue
-	-	on	Green
on	on	-	Magenta
on	-	on	Yellow
-	on	on	Cyan
on	on	on	White

d) Light is made up from 3 primary colours, red green and blue. Depending on the quantities of each, all colours from black through white can be produced. Colour monitors have three guns, one each of red, green and blue. In a simple colour system each gun can be turned on of off thus producing 2^3 possible colours (8 combinations). This system is known as the RGB or CGA system. It uses 4 bits of memory per pixel. 1 bit for each colour and one status bit.
e) As some monitors can do more than just turn the electron guns on or off, but allow an infinite number of levels of brightness in between, we have the ability to produce more than the 8 colours in a simple RGB system. A monitor which can be used in this mode is called an **analog** monitor. Your home TV has an analog monitor built in. With analog monitors the maximum number of colours is limited by the display card used. That is the card produces the colours not the monitor.
f) EGA/VGA. The next most used standard for graphics was to use 2 bits of memory per gun or six bits in total per pixel plus 2 status bits; taking the total to 8 bits (or1 byte) per pixel. This takes the maximum number of colours from 8 to 64, a vast improvement for twice the required memory. To produce the analog signal, digtal to analog converters are used in graphics cards (1 per RGB output), to convert the digital word into an analog value.

EGA Colour Chart

2 Bits Red information = 4 levels
2 Bits Green information = 4 levels
2 Bits Blue information = 4 levels

Total colours = 4x4x4 = 64 colours

Displayed as 4 palettes of 16 colours

g) Still more colours are available wi Super VGA (800x600), extended VGA (1024x768), and better resolution. 6 bits per output plus status bits = 16 active bits or 2^{16}, which is 65,536, colour combinations. In 800x600 mode with 256 colours we need 512K RAM

Continued next page

GRAPHICS RESOLUTIONS.

Because of the trend towards What You See Is What You Get screen graphics, graphics display resolutions are increasing day by day.

How we came up with these resolutions.

Originally the dot matrix printer displayed 80 characters per line and a nine pin head used an 8x8 format for graphics. As screen displays were 80 columns by 25 lines for word processing, or text, the way it was broken down was to allow 80 characters by 8 horizontal pixes of a total of 640 horizontal pixels. As the normal screens displayed 25 lines of text vertically, the vertical resolution became 25x8 vertical pixels, or 200 total. Thus the first standard became 640x200 in monochrome. This took up a total of 128,000 pixels or 16K of memory.

In CGA mode, 1 bit is used for each RGB output and one for status, a total of 4 bits of memory. Colour could not be produced with 16K of memory and 640x200 resolution. Hence a compromise was reached whereby 8 colours in 320x100 was used. This works out at 32,000 pixels at 4 bits each; still a total of 128,000 bits or 16K bytes.

Screen resolution has followed hard copy.

Output Device Resolutions

Dot Matrix Printer

80 characters per line 9 pin head
using 8x8 graphics format
gives 80x8 = 640 pixels
across 8" paper gives 80 DPI

Laser Printers

Most laser printers 150 - 300 DPI
(in graphics mode) - 2400 pixels
some range up to 1200 DPI
(using postscript) - 9600 pixels
cost $ 1500 - $22000 per printer

Plotters

Plotters use vector output not pixel.
Resolutions vary depending on the
make and size of the plotter but
most have a step size of from
.1mm to .01mm per step, this equates to
2000 to 20000 steps across an 8" page

Photographic film

Usually 4000 x4000 pixels but in 35 mm
format 6200x4650 due to grain
SLIDE MAKERS
use sheet film in 5"x4" format and give
20000x16000 pixels or 4000 DPI.
Cost $35000 used for commercial art

HOW A MONITOR WORKS.

CRT construction:

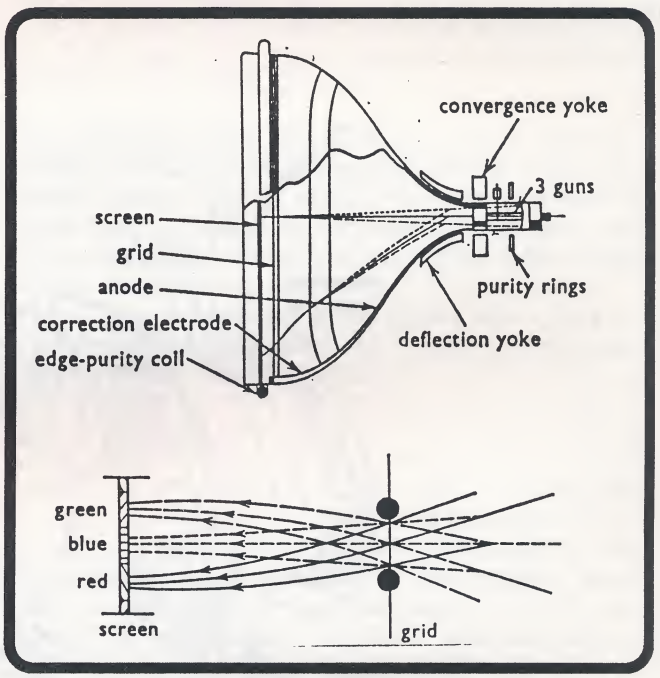
Shadow mask & trinitron CRT's have triad guns i.e. guns arranged in a triangle.

Black stripe tubes have their guns in line, one above the other, so are easier to focus.

On the home television set the viewer tends to concentrate on the centre of the screen but for computers the whole screen is important hence adjustments are a compromise as it is almost impossible to get perfect focus (convergence) over the whole area of the screen.

Scanning and interlace:

To create the image on the screen the electron beam is deflected so as to scan across the face of the tube line by line. To create one frame the screen is scanned twice, the second scan being offset between the previous scan lines. This is called an interlaced scan.



Convergence (Registration):

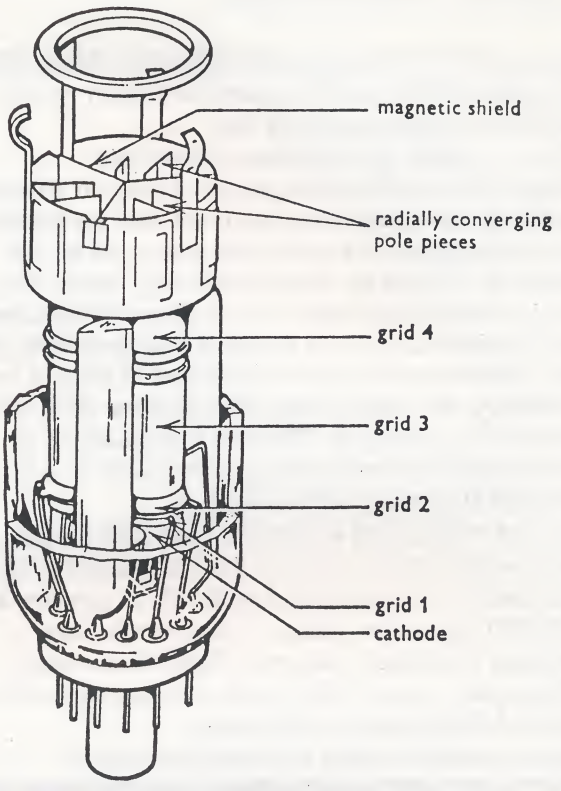
The colour CRT has three guns and R/G/B coloured phosphor dots on the CRT face. It is essential to ensure that each gun lines up with the correct coloured dots irrespective of the varying distances from the gun to the face of the tube. Therefore convergence, or registration, must be adjusted on the CRT.

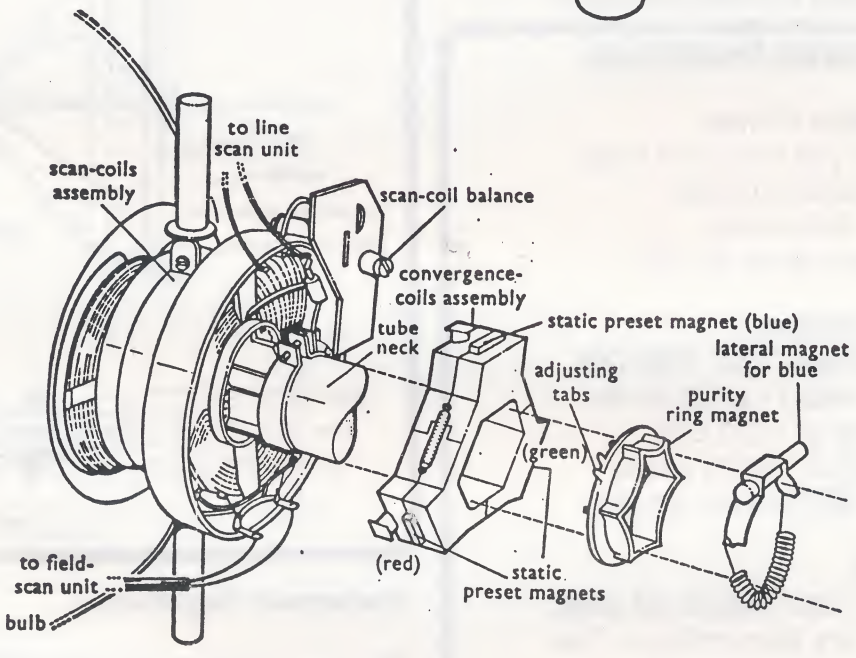
Note that the term dot pitch refers to the size of these dots of phosphor. The smaller the dot pitch (i.e. size of the dots of phosphor, the higher the resolution of the screen. A .28 dot pitch results in 3 times more phosphor dots than a .40 dot pitch.

Continued next page

CRT ALIGNMENT PROCEDURE

Purity: Use a white screen, degauss and check for colour impurity.
Dynamic Convergence: Use the ring magnets
1) Turn off blue gun
2) Use dots to line up red & green guns
3) Use crosshatch to fine tune
4) Align blue gun to red and green
5) Adjust centre first and compromise towards outside.
Focus:
Use dot pattern. Focus for even focus all over.
Gray scale tracking: Yse colour bars or white
1) Set A1, A2, A3 voltages to cut off.
2) Set drive for highlights
3) Check with change in brightness
4) Check resolution
Linearity:
A circle should be a circle and centred.
Contrast & brightness: Use colour bars, adjust for hue and saturation (are you colour blind???)





For Sale : Apple][Instant Pascal; full documentation, original software, plus extra programs disk and extra reference manual. Also Odesta "How abou a Nice Game of Chess?". All for $150 ono, or preferably, swap with recent version of Appleworks with full, original documentation and disks.

Phone Jason on 272 4324

Wanted to buy: 1 mouse to suit Apple][c.

Phone Sam Staltari on 295 3689

The Video Overlay Card.

By David Pettinger.

At the last meeting at Prospect Keith Zerna and myself attempted to give a very brief introduction to the latest release from Apple, namely the Video Overlay Card.

For the benefit of all the people that were not able to attend the meeting I am writing this article to let you know the basic facts.
Firstly what is this video overlay I hear you ask, well it refers to the process by which a video image is combined with computer generated graphics. The term overlay actually refers to the fact that the graphics appear on top of the video image.
By video image we are actually referring to television sets, video cassette recorders, video cameras etc. On the computer side of things we can use text, pictures, graphics and animation. So we have a video image and a computer image the card combines the two together to produce the overlay. The overlay output signal is in two forms, composite and RGB. Let me explain, composite means a complete signal containing all the picture information in the one signal. On the other hand we have the RGB which as you may have guessed stands for red, green and blue, the signal is split in to the three primary colours and the monitor is fed with the three separate signals. In practice a thick cable with multiple pin connectors are used. The quality of the resulting pictures is much better than for the other method.

Lets pause for a moment from the technical side and consider some practical examples that you can put this amazing new product to. Perhaps the most obvious use is to incorporate text over pictures for identification purposes, in the same way as a television station identifies people during an interview situation. This is called a super which is short for superimposed i.e. overlaid, do you begin to get the picture (pardon the pun) Perhaps one of the most exciting uses is with a video camera, imagine that you have a block of land and can not decide what house to build, with video overlay your problems are solved, simply video the block of land with the camera. With the computer and a suitable drawing program draw several houses then combine the two to produce an overlay and record the resultant on a video recorder. Then when you play it back you will see the various houses on your block, perhaps add a tree or two, it is only limited by you own imagination and your drawing ability.
Other examples include a coach adding arrows over a game, footy basketball whatever. The purpose is to show players what they should have done i.e. if you had passed the ball instead of... etc How about a photo album graphic with a difference i.e. moving pictures. Finally how about a super of a map identifying certain features of a video of a city skyline for a video to be sent overseas etc.
It is possible to make the super opaque (can't see through it) or translucent (can see through it) but more about that later.

A powerful piece of software comes with the video overlay card called "Videomix" This software allows you to adjust the mix of graphics and video images in an overlay and also lets you adjust the colours of the final video image to be displayed or recorded.
Lets talk a little bit more about the video recorder and the equipment needed to get reasonable results. The computer can be a 2E or a 2GS it can not be a 2C because you can not install the card in to them. If you own a GS you will have an RGB style of monitor, if you have a 2E you will most likely have a composite monitor. To get the best out of the system you will have to use two video recorders one to play the chosen video images i.e. the block of land, and one to record the final mix on to. At this stage of development the final mix can only be stored on videotape, it can not be saved as a file to disk. This feature may well be added later on.

So what you can effectively do in your own home is to produce professional looking results that really make home videos great entertainment. I hope that I have not confused anybody too much with my ramblings. At the Christmas meeting Keith and I will be talking a bit more about the card and will hopefully have some videotape to show you some of the things you can do. Like I said it is really only limited by your own imagination and/or your artistic ability. If there is sufficient interest I will produce another article explaining more about the video overlay card.

Flobynoid II

By Jason Painter

A follow-up to the review in "Applesauce", October 1990
I've been playing Flobynoid every day for about a month now. It's a very addictive game as you can see!
Since half the screen instructions are in French and since probably half of us can't understand French, I'm going to give you a short instruction book.

The Game
There are a few features hidden in the "Pulsating Robot" opening screen that I found out through experimentation. One of them allows you to see the high scores, just press the left-arrow key and it will be displayed in the middle of the screen with the ball bouncing unaffected behind it. Pressing any other key causes it to disappear.

If you're like myself who gets annoyed at having to start from scratch every time I make a few too many mistakes on levels above twenty, there actually is a way to cheat.

Flubbed up on level twenty two and want another chance at it without having to play levels one to twenty again? Easy, the number keys give you access to levels ten to ninety. Just press a number key and you can begin to play at the level represented by it, times ten. For example, pressing four will start game play at level forty.

There is a total of ninety-two "tableaux" (levels). When you finish the last level, "The ultimate one", there is an interesting screen display of..... Well you'd better find that one out for yourself!

I want to give you a couple of tips on using two of the tools that drop from the sky. The first one, the "C" that makes the bat capture the ball, is most useful for re-positioning your bat to get a better shot. Pressing the mouse or joystick buttons releases it. If you don't release in two or three seconds, it automatically releases. The other tool the "L" (lazer), is best utilized by holding down the button while keeping the ball in play. The processor is slowed down by this and it makes it just that little bit easier to predict the ball. Go for double-hit and lower bricks as a priority.

The Editor

The editor is accessed from the "Pulsating Robot" screen by pressing "M" and <RETURN>. This will give you a screen display of half-confusing French. Don't worry about that. Press any key and you will be in the edit mode.

The screen displays: a blank playing field; a cursor; a white brick shaped object; and an edit menu at the bottom.

You move the cursor with the arrow keys. No mouse or joystick support here I'm afraid. The type of brick selected appears in a small window near the lower-right corner of the screen. Pressing "B" changes the brick type. You have four types: Single-hit; "incassable" (unbreakable); blank and double-hit, in that order.The blank brick is for erasing. Pressing the space-bar lays a brick. Pressing "E" effaces (erases) the whole screen. A tip: try not to use too many "Incassables"!

To access the other options, Press "O". This will replace the edit menu with the options menu Pressing "S" will save your new level to a disk. Be warned, it will not save your level to any disk other than one prepared with the "F" (format) option on the menu. The program appears to use a modified version of DOS.

When you press "S" you will be asked for the number of the level you wish to save. This is accomplished by pressing the left or right arrow keys until the desired number is displayed on a three digit level indicator. It's fast and a pleasure to use. According to this display, you can have a total of four hundred and seven levels! That will keep you going for a while.

You will then be asked for the name of your new level, to be centered and displayed when you come to play it. You have a total of twenty three characters with virtually a full character set, so it's quite versatile. Type this in and press <RETURN> Your new level is saved.

Editing a level is similarly easy. Press "E" from the options menu and you will be asked for the level to edit. Selecting a level number is done in the same way as when saving. Press <RETURN> and it will access the level, display

Continued next page

it and you can then fiddle with it. You won't be able to access Flobynoid's built in levels though. They obviously don't want you cheating!

The other options are ESCape back to the editing functions and quitting to the editor. To quit from the "Editeur", press "Q" and you will be asked if you're right mind concerning this, so press "O", (Oui, Yes) of course.

Playing Your Own Levels

To play your own levels, Press "T" while in the "Pulsating Robot" screen. This will access some sort of loader on the Flobynoid disk. When it's finished remove the Flobynoid disk and insert your own. You'll have a display of instructions asking you to select the level at which you want to start playing. Again you use the left and right arrow keys to count the levels up or down on the three digit display. Press <RETURN> to play or ESC to go back to the Flobynoid disk. You will have to change disks for that option or risk being accused of something unpronounceable in French.

If the program can't access a level, it "Game Overs" you and displays your score and the level that you achieved. Unfortunately there is no high score file for your own disk. To play again, you have to re-insert Flobynoid and press a key and go through the whole rigmarole again. However if you have created a few good levels it is worth the effort.

With a couple of my friends I've created fifteen of the meanest, toughest, Flobynoid beating levels that ever existed. Well, maybe they're just pretty good. Creating your own levels allows you to get more out of the game when the provided levels become "Yawn-ish". Maybe we could have a custom Flobynoid level disk created by the club members, what do you think?

Footnote from the Disk Librarian
Well I must say that Jason's efforts are most gratifying indeed. It was great to get some much needed feedback from the members. Jason's idea about a member created levels disk is a good one "What do you really think"? Perhaps you have a few hints and tips about your favourite games, why not share them with the rest of the members. Remember I will type them out for you and prepare them for the magazine, just send me a legible hand written copy, or ring me on 2632164 to discuss it, or see me at the next meeting if you prefer. It does not matter how little it seems, if every member contributed a little we would have loads of material.
Be sure to stock up on disks at the next meeting as it's your last chance before Christmas.

Letter to the Editor:

I've recently acquired an Apple Imagewriter II. I mainly use the Bank Street Writer][c and I use two sizes of paper. I mainly use cut-sheet paper but sometimes I use pin-feed paper. The two types of paper are of differing lengths so I have to alter the number of lines per page on the Bank Street Writer utility whenever I want to use one type extensively. This involves re-booting and is very messy.

What I want to be able to do is alter the form length by using the software commands from within the Writer. It has a feature which allows you to enter printer commands into your document. The only control code that I can see that would do this is Esc-H. This is the one given in the control code listing in the ImageWriter][manual. The confusing thing about it is that it sets the form length in increments of "nnn/144". I don't understand this. I want to swap between 66 and 83 lines per page at will. How can I use this control code to do this?

Jason Painter,
SAAUC member.

ProDOS and Basic System Changes

from Apple II Technical notes reprinted with permission from Apple Computer, Inc.

This note describes the updated ProDOS 8 and Basic System files. They describe the bugs removed, additions, and known bugs that are still there.

ProDOS 8 1.9

o New selector and dispatcher code was added for machines with 80 columns. The old code is still present for machines without 80-column capability.

o Fixed two bugs involved in booting into a ".SYSTEM" program larger than 38K. First, ProDOS 8 should be able to boot into a program as large as 39.75K, but was returning an error if the ".SYSTEM" program was larger than 38K. Second, when attempting to print the message "*** SYSTEM PROGRAM TOO LARGE ***", only one asterisk was printed. Both these bugs are fixed.

o No longer requires a ".SYSTEM" file when booting. If ProDOS 8 does not find a ".SYSTEM" file and the enhanced selector and dispatcher code is installed, ProDOS 8 executes a QUIT call.

o KVERSION is still $08.

Known Bugs in ProDOS 8 1.9

o ProDOS 8 doesn't handle seedling sparse files correctly. If you have a seedling file (only one block, less than 512 bytes of data) and use SET_EOF to grow the EOF without writing any data, the file becomes a sparse seedling file. The EOF indicates the file is a sapling or tree file, but in fact only one disk block is used. The storage type correctly indicates a seedling file.

If you have such a file, and try to shrink it by setting the EOF to a value that is not an even multiple of a block boundary, ProDOS 8 gets confused and trashes some of the second half of the real data block.

o If you perform a SET_PREFIX to a slash (/) followed by a SET_PREFIX to a volume name not preceded by a slash, the prefix gets set to the first letter of the volume name.

BASIC System V1.4.1

o Fixed a bug in the mark handling routines. When using the "B" parameter to indicate a byte to use as a file mark, the third and most significant byte would never be reset before the next use of B. For example, if you used a B value of $010000 and then used a B value of $2345, BASIC.SYSTEM 1.4 would use $012345 for the second B parameter value.

Every studio, teacher, student and song-writer needs to own

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Mickie Schaffer, in The Music Paper from New York City

Just type in the chord names for any song, using standard chord symbols (like C, Fm7 or C7b9), choose one of 24 styles and Band-in-the-Box does the rest...

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NO HARD DISK? - TRY THE RAM-DISK ALTERNATIVE

By Andrew Bell

Adapted from A.C.T. Apple Newsletter Nov 90

Do you run your Mac without a hard disk, and are frustrated by constant disk swapping and running out of memory?

Well, I've found one economical and efficient answer that suits me really well. Its been made possible by the enormously reduced cost of memory these days. If you look in the ads in Australian MacWorld, you will find some firms that can supply 1 Mb of memory for $99.

What I've done is installed 4 Mb of memory in my Mac Plus and used 2.5 Mb of it to run a RAMdisk. In other words, I now have three disk drives - my two 800K floppies and a further 2.5 Mb disk that operates in memory. The advantages are worth spelling out.

Firstly, it enables me to run MacWrite II with its application, main dictionary, help guide, and thesaurus (nearly two floppies worth) quickly and easily. I have loaded these into the RAMdisk program "RamDisk+" and it runs like the wind! (I keep my output text file and my user dictionary on a floppy, because RAM is volatile.)

One of the nice features of RamDisk+ (available as shareware on SAAUC Utilities #1) is that you can also copy the System folder into itself and eject the boot-up disk - in other words it can lift itself by its boot-straps! This means both floppy drives are available for other work. In fact if you've only got a single floppy drive, a RAMdisk is cheaper than a second floppy drive, and it has another benefit - speed.

Because the Mac can read and write to memory many times faster than it can from disk, you will find your programs running impressively fast - faster than from a hard disk, in fact. Moreover, because of the extra memory, you will find you can use MultiFinder, a scheme whereby you can have all you applications open at once, another way of increasing speed. I appreciate the rapidity with which I can use the spell-checker on MacWrite II. I can also keep open a document (or two) while I use the thesaurus (Wordfinder DA) and use other desk accessories.

Of course, if you want ready access to dozens of applications, then a hard disk is the answer. But most people use two or three main ones, and these can be easily accommodated in a RAM disk. Even if you have a hard disk, a RAM disk will speed things up.

Memory is always useful. So even if you decide to buy a hard disk at some later time, the extra memory you have will come in handy.

RamDisk+ is easy to use. You simply put it in a folder along with the files you wish to load into it (in particular your system files), set the RAMdisk's size and restart. Once the startup disk has been ejected, you get an icon that represents the RAM disk. Then you treat it like any other disk drive, and copy to (and from) it other files and applications of your choice.

Don't forget dear Roger bates who has been good enough to place RamDisk+ at your service. He asks for a $20 user fee.

What I really like about a RAM disk is that it's absolutely quiet. I don't have the constant whirring of a hard disk drive to annoy me, and since I have a MacPlus (with the virtue of not having a fan), I can hear myself think - in fact, in the still night hours I can listen to my faintest thoughts!

Since there's no hard disk bearings to wear out, I leave my Mac powered up all the time. That way the RAM disk stays intact, ready for me to use whenever I come to the computer. And leaving the Mac on is good for prolonging the life of certain parts on the power board that suffer from thermal expansion and contraction when the power is switched on and off.

In summary, a RAM disk can turn your Mac into an instrument that operates as quietly and quickly as you own thoughts - an uncanny but delightful experience.

New Mac][disks

Ian Bagust

Mac][#04
- 881/2 Demo
- Rainbow1
- Solarian II

Gif #01
- 10brooke.gif
- 2010.gif
- Apple Balls gif
- ATAT.gif
- barton.gif
- countach.gif
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- Giffer1.01

Gif #02

Gif Pictures
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- START UP SCREEN
- Trek.gif
- Wet T Shirt.gif

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- Giffer1.0Docs

Gif #03
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- Footprint.GIF
- IC Face.GIF
- Landscape.GIF
- Mandrill.GIF
- OwlMan.GIF
- Sailboat.GIF
- Surfer.GIF
- USC Girl.GIF
- Venus.GIF

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- Giffer1.0Docs

Gif #04

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- Balloons.GIF
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- Cheetah.GIF
- Cheryl Tiegs.GIF
- Curly & Moe.gif
- Del Yocam.GIF
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- Juggler.GIF
- Kim Donut.GIF
- MacPaint Girl.GIF
- Martini.GIF
- Robot Arm.GIF
- Sailboard.GIF

Gif #05

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GoblinKing
Lovers
Paradise
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Voyage.GIF
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ADP Cop
Girl w/Orb
Mendo
Shower
SpeedRacer
Tennis
Misc.
FloorPlan.GIF
IC Face.GIF
IceCream
KimDoughnuts
Lighthouse
Miller
Mt. Hood
Nagel
Nagel10A
Nagel20
Nagel5
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Moonrise.GIF
NASA Logo.GIF
Orbiting Shuttle.GIF
Shuttle
Station

Gif #06
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Wizard.gif
Anatomy
Abdominal Aorta.gif
Heart.gif
Cars.GIF
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79Rx7.gif
911T.GIF
944GTP.gif
BlackCountach.gif
BlueGhibli.gif
m1.gif
TestaRossa.gif
Cats.gif
Cat #1.GIF
Cat #2.gif

MacII Colour Games.

Klondike 3.6 - A Solitaire card game in colour.
Color Canfield - A variation to Solitaire card game.
GunShy 1.2.1 - A game similar to Shanghai, pick the tile pairs.
Brickles - An advanced version of 'Brick out'
CrossMaster - Make your own crosswords.
ColorPuzzle DA - A colour version of the D.Access puzzle.
Worms - Creates worm patterns to your input options.
Mesmer - Pattern creator.
Color Kaleidoscope - Creates colour kaleidoscope which change constantly.
HangMan Plus - An updated version of the old hangman game.
Lunar Exposure Calculator - Automatically calculates exposure value for lunar photography.
Biorhythm II - Calculates and compares two biorythms.
ColorJack 1.0a2 - Blackjack game in colour.
ColorIconBounce - Icons bounce across Screen.
Color Boxes - Generates color boxes.
Spirograph MacII - Generates colour spirals etc.

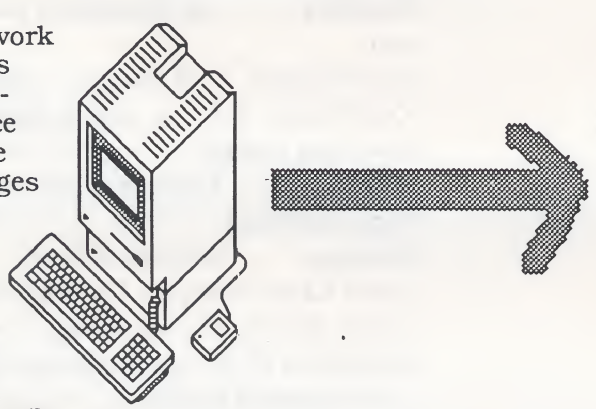
Ergonomics in the Computer Age

by Arthur T. MacKay, O.D.

Ergonomics is defined as "the study of the problems of people in adjusting to their environment; esp., the science that seeks to adapt work or working conditions to suit the worker...." With today's increasing use of computers, people are experiencing eye, wrist, shoulder, neck, and back problems, particularly professionals who work with computers all day every day.

Eye Problems
Initially, as people feel stressed and fatigued from viewing a computer screen, i.e., video display terminal (VDT), they will see an eye doctor for a quick solution, but there is much more involved here. The visual trouble associated with VDTs has its roots in the fact that you are not designed to sit and stare at a screen for 40 hours per week. Your visual system needs to be refreshed continually during the day. Without changing stimulus, the visual abilities fatigue quickly.

The eyes must work together to focus print clearly. Fatigue may reduce the ability to see clear single images and give blurry or double images. When humans stare, their blink rate decreases, their tear layer dehydrates, and dry, uncomfortable eyes result.



A simple cover can shield out overhead light and reflections from the environment

A thorough eye examination may reveal areas of poor eye health and vision that are correctable with the proper glasses. Most healthy people, however, should just be aware of potential eye fatigue and take measures like planned breaks and controlling their environment and posture. A classic "mini break" is to frequently look away from the monitor at a far distance to relax the strain on the near focus. Another help is to sit back from the monitor at least 20." Getting up from the chair to get a form or some water is also advised.

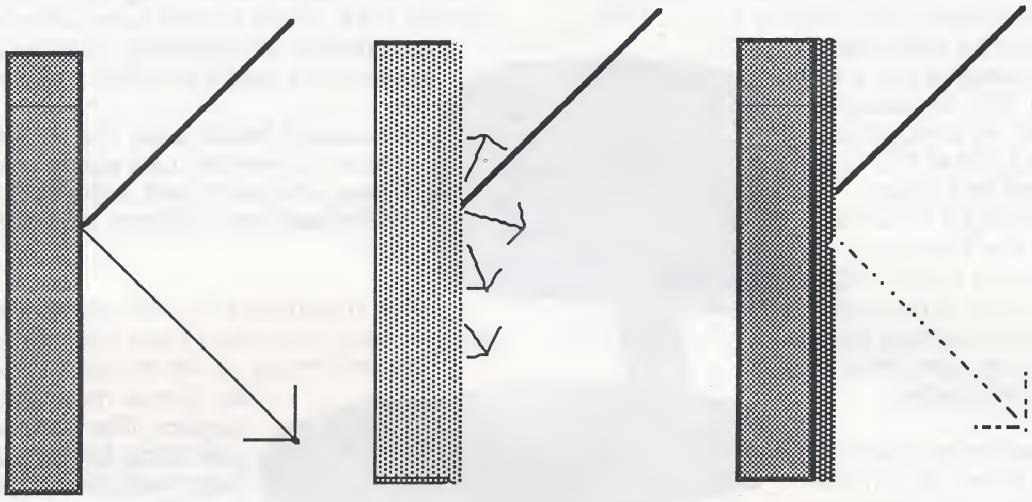
Lighting Glare
Office lighting may cause "discomfort glare." Overhead lights, surrounding lights, and window light may cause difficulty in seeing documents. The overhead fluorescent tubes may well illuminate the desk directly below, while causing glare to the desks in front and in back. The glare is unwanted extra light that may also cause interference with viewing a dark computer screen—a stressful situation.

The "Indian Test" for glare used at the University of California, Berkeley consists of shading your eyes by saluting or like an Indian scouting the plain. If this results in relief of discomfort glare, then you must deal with an overhead lighting glare problem. The solutions may include turning off some rows of lights overhead, reorienting the workstation (careful to reduce reflections), using blinds and drapes on windows, eliminating bright white surfaces, wearing a visor, using parabolic lamp reflectors, relying more on indirect background lighting, softer office gooseneck lamps directly on the desk, adjusting the brightness screen of the VDT, erecting partitions between workstations, using matte finish on visible surfaces like desk tops and keyboards, and using ceilings with 80-90% reflectance and walls with 40-60% reflectance (IES General Electric Standards).

Reflections
The worst part about reflections, is that the office light and the window light are reflected off the screen into the computer user's eyes. You should evaluate reflections by turning the computer screen on and off. In this way, you can check the window and overhead reflections. Reflections can be eliminated by using antire-

Continued next page

How does a glare filter work?



Light Usually Reflects off Hard Smooth Surfaces

Light is Diffused and Scattered by Soft or Screen Surfaces

Light is over 90% absorbed by a Coating of Magnesium Fluoride on the surface

flection screens and hoods over the monitor. Antireflection screens absorb reflected light by using a screen coating that causes light waves to bounce into each other and destroy themselves. A monitor hood serves as a giant visor to shield the screen from the overhead glare and reflections. TV cameramen use such hoods for large cameras outdoors.

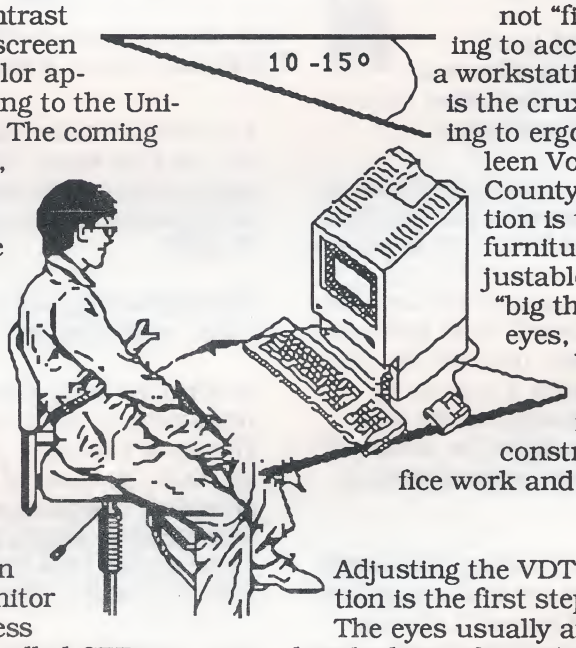
The glare of the computer screen can be controlled by picture quality, background color, flicker (refresh rate), contrast and brightness controls, and screen color. The best background color appears to be a light one according to the University of California, Berkeley. The coming "Windows by Microsoft," OS-2, and the Macintosh operating system utilize light backgrounds with dark letters. The Macintosh screens are the most favored types at Berkeley! These may offer better contrast for easier vision.

The method by which a screen refreshes itself can cause a flicker in the image. Since the human eye detects flickering images at less than 60 Hertz (cycles per second), in the straight ahead view, a monitor that refreshes at this rate or less may appear to flicker. This is called CFF or critical flicker fusion. Below this rate, the eye sees everything in a flicker, which is disturbing. Newer monitors are available with high refresh rates of 70 to 80 Hz. Such screens may "feel" more comfortable as the flickering is kept down.

Hardware and Furniture

Postural problems have occurred as most hardware and workstations are designed to accommodate the 95th percentile man— a man of 5' 10" and 175 lbs. Anyone who is taller, shorter, lighter, or heavier (or not a man) may not be comfortable as they do not "fit" the equipment. Trying to accommodate your body to a workstation that just doesn't fit is the crux of the problem according to ergonomic consultant Eileen Vollowitc of Contra Costa County, California. The solution is to make hardware and furniture more flexible and adjustable so as to address the "big three" health risks of the eyes, hands, and neck and back. These problems are exacerbated by the repetitive motions and constraining activities that office work and the computer entail.

Proper Eye Distance from the screen & 15° Below the Eyes



Adjusting the VDT screen height and location is the first step to relieve the eyes. The eyes usually are most comfortable when looking 10 to 15 degrees below the straight ahead view. Getting the computer monitor off the computer and lower on the table may be a priority. This is why vertical stands are offered to hold the actual CPU on

Continued next page 17

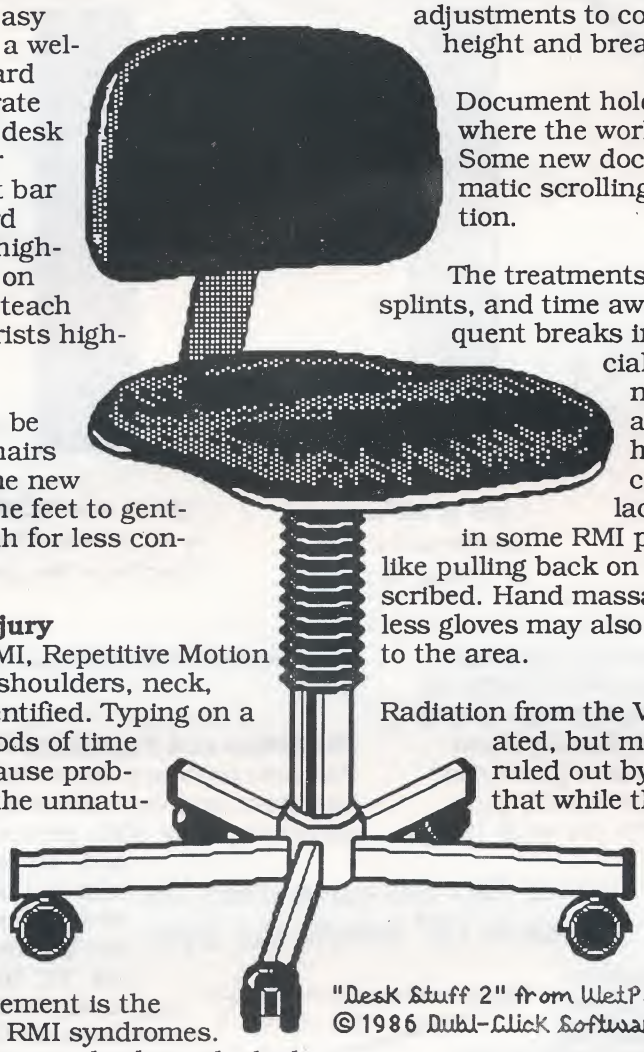
the floor next to the desk.

The chair height may have to be adjusted to align the keyboard and monitor better. Pneumatic lift chairs with easy valve adjustments are a welcome help. The keyboard should rest on a separate adjustable level of the desk or be placed in a lower drawer. Having a wrist bar in front of the keyboard helps keep the wrists higher to lessen the strain on them. (Piano teachers teach pupils to keep their wrists higher than their hands.)

Foot support may also be important when the chairs have to be raised. Some new foot stands allow for the feet to gently "rock" back and forth for less constrained positioning.

Repetitive Motion Injury

A syndrome labeled RMI, Repetitive Motion Injury, for the hands, shoulders, neck, and back has been identified. Typing on a keyboard for long periods of time without a break can cause problems originating with the unnatural positions of the arms and hands on the keyboard. Carpal Tunnel Syndrome, with wrist numbness, tingling, pain, and limitation of wrist movement is the most recognized of the RMI syndromes. Tendonitis and arthritis are also being looked at among the RMI family of problems.



"Desk Stuff 2" from WetPaint,™ © 1986 Dubl-Click Software, Inc

R. Markinson, M.D., of San Francisco General Hospital, is a hand specialist who has studied the problem, "The computer keyboard is poorly designed because it forces us to move our hands and arms in an unnatural manner. The keyboard forces people to 'twist' their forearms so that their palms are down. In addition, the hands must be angled in such a way as to stretch the tendons and muscles of the forearm. Stretched muscles are asked to work millions of times. The effect may be poor circulation to the wrist."

To mitigate the problems of twisting the hands and arms, many companies are producing keyboards that "break apart." One such device, the "Tony" keyboard bends to allow the hands and shoulders to be relieved of strain. The center part of the keyboard actually bends "up" to allow your hands to cradle the sides of the keyboard like an "A" frame house.

Ergonomic chairs, like the "Neutral Posture Chair" resemble a sports car bucket seat with raised seat pads and air bag adjusted support for the back. Such chairs have air valve height adjustments to constantly change the seat height and break the RMI tendency.

Document holders get the document to where the worker can easily read it. Some new document holders offer automatic scrolling, lighting and magnification.

The treatments for RMI are medication, splints, and time away from computing. Frequent breaks in the routine are beneficial. Stress reduction techniques, like Biofeedback, are being investigated to help increase the peripheral circulation and prevent any lack of blood flow implicated in some RMI problems. Hand exercises, like pulling back on the hand are being prescribed. Hand massage and the use of fingerless gloves may also help increase circulation to the area.

Radiation from the VDT screen has been evaluated, but most concerns have been ruled out by the experts. Some feel that while the X-ray radiation is not significantly emitted by the VDTs, the electromagnetic radiation of the office lights may be worse than any electric or magnetic fields emitted by the VDT. Screen shields and special monitors are offered to eliminate this radiation, but the jury is still out on this issue. Screen shields can run about $200 while new monitors to limit radiation (electric and magnetic fields) run about $1,200.

Remember the key words: Vision, Environment, and Posture!

[Reprinted from News Break, April 1990, the newsletter of MUG ONE, Macintosh Users Group of Oneonta, New York. Arthur T. MacKay, O.D., is Chief of Optometry, Mary Bassett Hospital, Cooperstown, New York. He deals with general vision problems, partially sighted, and contact lens fitting. He is also co-program chair for MUG ONE.]

MUG NEWS SERVICE, 1990

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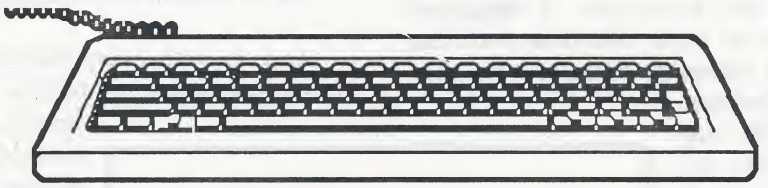
The Need to Redesign the Keyboard



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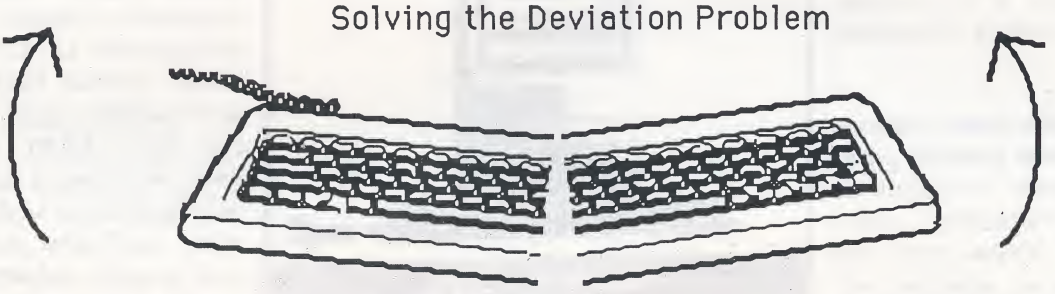
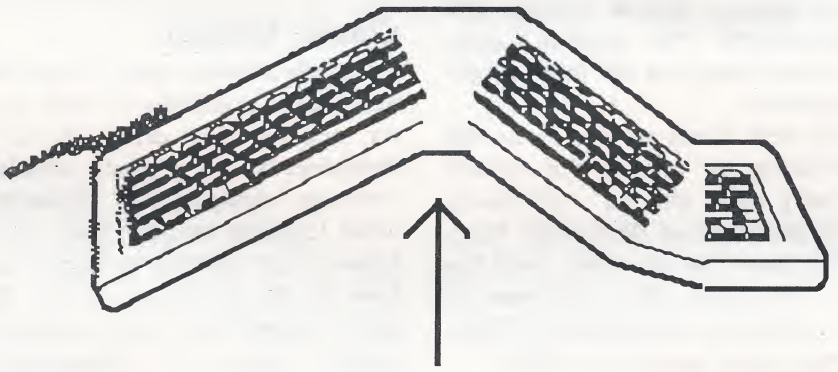
Solving the Deviation Problem



Solving the Pronation Problem



MEMBER MNS MUG NEWS SERVICE™

The reviews on the next 4 pages are reprinted from Macinations, November 1990

The Mac Classic

Now, Apple brings the advantages of Macintosh personal computing to more first-time business, education and home computer customers by offering full Macintosh functionality at under A$1700 suggested retail price. The Apple Macintosh Classic personal computer is the lowest cost Macintosh yet and incorporates the most popular features of the company's best-selling Macintosh SE.

To offer these features at the lowest possible price, the internal components were completely redesigned. Outwardly, the Classic is an updated version of the traditional all-in-one Macintosh. Apple not only improved the performance, but kept the standard built-in features and small, transportable design. The result is a complete system that offers customers the most affordable Macintosh computer.

"We've opened new doors to the Macintosh standard of computing by pricing the Classic within reach of many more people," said Randy Battat, Apple's vice president of Worldwide Product Marketing. "We know that for some, price has been an obstacle. The Classic offers customers all the most popular, trademark characteristics of Macintosh at a price many more people can afford."

Classic Features

The Macintosh Classic retains all of the most-valued advantages associated with Macintosh computers, such as unparalleled ease-of-use and consistency between thousands of applications. In addition, the Macintosh Classic computer includes the following features:

- *Improved system performance:* The Macintosh Classic performs 30 percent faster than the Macintosh Plus, offering customers a more responsive system.
- *Optional internal hard disk:* A 40-megabyte (MB) hard disk drive provides customers with ample storage for their files and applications, further improving system performance.
- *High-capacity removable storage:* The Apple SuperDrive, a 1.44MB, 3.5-inch floppy disk drive provides customers with almost twice the storage capacity of 800K disk drives and allows users to conveniently transfer data files between Macintosh, OS/2, MS-DOS, and Apple II ProDOS systems.
- *Easy memory expansion:* Customers can add up to 4MB of RAM to the Classic without having to remove their existing memory.

And, as with every Macintosh since 1984, the Classic has numerous built-in capabilities. These features include AppleTalk networking, which allows customers to easily connect their systems to users, printers and file servers; Small Computer System Interface (SCSI), which lets customers connect such peripherals as CD-ROM drives, external hard disks and scanners; Apple Desktop Bus (ADB), which gives customers a standard way to connect keyboards, mice, trackballs, modems, and graphics tablets; and sound output lets customers play back voice messages and sounds.

Classic Design

Apple's lowest cost product design, the Macintosh Classic combines a 9-inch monochrome monitor, optional hard drive, and all other necessary components into a small, affordable and easy-to-transport configuration. Students will enjoy the small footprint because they can easily move the Classic from campus to home, or from the library back to the dormitory room. Transportability is also a benefit for professionals who occasionally need to move to a different job site or take a computer home for the evening or weekend.

Configurations

The Macintosh Classic will be offered in two models: The Macintosh Classic 1/SuperDrive has 1MB of RAM and a built-in SuperDrive floppy disk drive. The Macintosh Classic 2/40 has 2MB of RAM, a SuperDrive floppy disk drive and internal 40MB hard disk drive. Both configurations come standard with a keyboard, mouse, complete documentation, Macintosh System Software, HyperCard 2.0 software, training disks, and a one-year limited warranty. As with all Macintosh computers, the Macintosh Classic will run System 7.0, Apple's next major release of the Macintosh operating system.

The Macintosh Classic is now available in volume worldwide through all authorized Apple resellers, for about A$1695, including tax.

BUT BE WARNED, the memory expansion card is $295 (you can't use the ordinary $75 SIMMs.)

Macintosh LC

The Mac LC personal computer is the lowest-cost colour-capable Macintosh, cutting the cost of Mac colour by 58percent! The 16-megahertz 68020 microprocessor increases system responsiveness more than 100 percent over the Macintosh SE and Classic.

Built-in support for three Apple monitors eliminates the need to add a separate video card. The three monitors that may be used with the Mac LC are the Macintosh 12" RGB Display, the Macintosh 12" Monochrome Display, and the AppleColour High-Resolution RGB Monitor. You can use 256 colours on the Macintosh 12" RGB Display, 16 shades of grey on the Macintosh 12" Monochrome Display, and 16 colours on the AppleColour High-Resolution RGB Monitor. The optional Macintosh LC 512K VRAM (video random-access memory) SIMM (Single In-line Memory Module) allows the generation of more colours or shades of grey on all three monitors.

The Macintosh LC has been designed so you can add sounds to documents created with the computer.

The system comes standard with the 1.4-megabyte Apple SuperDrive disk drive. This allows read/write operations to 3.5-inch disks initialized for the Macintosh as well as MS-DOS, OS/2, and ProDOS. A 40-megabyte internal hard disk is also included.

There are seven built-in ports to connect the Macintosh LC with peripheral equipment. Built-in networking is also included. A processor-direct slot allow you to add a high-performance expansion card for additional graphics and communications.

The Apple IIe Card is available that allows the Macintosh LC to run all applications developed for Apple IIe systems. The Macintosh LC will be able to run applications supported by system software 7.0.

Features

- 68020 microprocessor, running at 16 megahertz
- *Built-in video support for three Apple monitors:* Macintosh 12" RGB Display, Macintosh 12" Monochrome Display, and AppleColour High-Resolution RGB Monitor
- Optional Macintosh LC 512K VRAM SIMM
- Sound input
- Apple SuperDrive (1.4-megabyte floppy disk drive)
- Apple IIe Card
- 020 Direct Slot
- *Seven built-in ports:* one SCSI port, one Apple Desktop Bus (ADB) port, two serial ports, one sound-in port, one sound-out port, and one video output port
- 40-megabyte internal hard disk drive
- 2 megabytes of on-board RAM, expandable to 10 megabytes

Benefits

- More than 100 percent faster performance and system responsiveness than Macintosh SE and Macintosh Classic systems
- Choice of Apple displays, both colour and monochrome
- 256 colours available simultaneously on the Macintosh 12" RGB Display, up to 16 shades of grey on the Macintosh 12" Monochrome Display, and up to 16 colours on the AppleColour High-Resolution RGB Monitor
- Allows display change without adding video card
- Colour depth can be increased to 256 colours or shades of grey on the AppleColour High-Resolution RGB Monitor and Macintosh 12" Monochrome Display.
- 32,000 colours on the Macintosh 12" RGB Display
- Allows you to add voice comments to voice-capable word processing, spreadsheet, and other documents; send spoken electronic mail messages; add voice excerpts to presentations; and create spoken password protection for sensitive files.
- Allows convenient transfer of data files between Macintosh, OS/2, MS-DOS. and Apple II Systems.
- Twice the storage capacity of 800K disk drives
- Allows you to run all applications that have been developed for Apple IIe computers. Preserves your investment in Apple IIe software.
- High-performance expansion card for communication, emulation, and graphics.
- Supports up to seven popular peripherals such as CD-ROM drives, scanners, and printers.
- LC 2mb/floppy ($2695, tax incl.) and LC 2mb/40 ($3995) will be available in late-January/early-February, 1991.

Low-Cost Mac IIsi

APPLE HAS just launched the Macintosh IIsi, a low-cost member of its high-performance Macintosh II line. This slim new modular computer delivers the most popular features of the Macintosh II line – superior performance, a wide choice of monitors, and rich expansion capabilities – but at a substantially lower price than ever offered before: at A$6995 (tax incl.) for the 2mb/40 version the Macintosh IIsi effectively reduces the cost of Macintosh II-class performance by 25 percent.

Macintosh IIsi

In addition, the Macintosh IIsi offers sound input capabilities that let users easily record live sound to applications and then play it back on any Macintosh. For the first time, Macintosh users will have a standard way to create documents that can "speak" to the reader. These features, combined with its low price and unsurpassed Macintosh ease-of-use, position the Macintosh IIsi as the computer of choice for customers who must balance power and affordability.

"As the most powerful computer in our new suite of low cost products, we expect the Macintosh IIsi to be a very popular choice among current customers and new customers alike," said Randy Battat, Apple's vice president of Worldwide Product Marketing. "When you consider its high-performance, ease-of-use, range of built-in features, and great applications support, no other computer on the market today has a more effective combination of overall performance and low price in one box."

Power and Expandability

At the heart of the Macintosh IIsi is a Motorola 68030 microprocessor running at 20-megahertz (MHz). This microprocessor includes a built-in Memory Management Unit (MMU), as well as instruction and data caches, making the Macintosh IIsi one of the quickest and most responsive Macintosh systems available.

The MMU is required to run A/UX, Apple's version of the UNIX operating system. In addition, the Macintosh IIsi supports an optional Motorola 68882 floating point coprocessor (FPU) that greatly improves the performance – as much as 100 times – of math-intensive applications. The performance foundation of the Macintosh IIsi allows users to tackle almost any computing task – from basic office productivity to complex graphics illustration, database management, and engineering work.

Ready for Expansion

As with all Macintosh computers, the Mac IIsi includes a rich set of built-in expansion capabilities. These features include AppleTalk networking, which allows customers to easily connect their systems to other users, printers and file servers; Small Computer Systems Interface (SCSI), which lets customers connect peripherals such as CD-ROM drives, external hard disks, and scanners; and Apple Desktop Bus (ADB), which gives customers a standard way to connect keyboards, mice, trackballs, modems, and graphics tablets.

Also built into the IIsi is one expansion slot. Users can choose to expand via an industry standard NuBus card or via an 030 Direct Slot card. The adapter card, which can be installed at any time by the user, plugs into the computer and provides an interface to the appropriate card.

Once installed, users can customize their systems to take advantage of the hundreds of NuBus or 030 Direct Slot cards available for more specialized capabilities, such as support for large monitors, access to networks, graphics acceleration, or other coprocessing capabilities. An added benefit is that either adapter card includes a 68882 math coprocessor.

Built-in Monitor Support

To meet different needs and budgets, the IIsi supports a wide range of monitors – from basic monochrome monitors to large colour monitors - in display modes up to 24 bits or 16.7 million colours (true photographic-quality colour).

Built-in support for up to 256 colours and levels of grey is a standard offering on four Apple monitors: the Macintosh 12-inch RGB Display (up to 256 colours or shades of grey), the AppleColour High-Resolution RGB Monitor (up to 256 colours or shades of grey), the Macintosh 12-inch Monochrome Display (up to 256 shades of grey), or the Apple Macintosh Portrait Display (up to 16 shades of grey).

Like other Macintosh II computers, the IIsi supports more than one monitor at a time, and other Apple and third-party monitors through an optional video expansion card.

Sound Input Capabilities

Sound is one of the most natural and effective means of communication. The ability to record, store, and play it back on the Macintosh opens up entirely new ways of communicating ideas and information with personal computers. By including a microphone and sound input capabilities standard with every Macintosh IIsi, users can include voice comments to word processing documents, presentations, spreadsheets, and even electronic mail messages with the hallmark cut-copy-paste simplicity of the Macintosh. And because all Macintosh computers already have the ability to play back sound, the millions of existing Macintosh users will be able to benefit from these sound-annotated documents as much as new users.

Configurations

The Macintosh IIsi is offered in two configurations: The Macintosh IIsi 2/40 has 2 megabytes (MB) of random-access memory (RAM), a built-in 1.44MB SuperDrive floppy disk drive and internal 40MB hard disk drive. The Macintosh IIsi 5/80 has 5MB of RAM, a built-in SuperDrive floppy disk drive and internal 80MB hard disk drive. SuperDrive, now standard on all Macintosh systems, provides almost twice the storage of 800K disk drives and simplifies computing in multivendor environments because it allows users to easily exchange data files between Macintosh, OS/2, MS-DOS, and Apple II ProDOS systems. As with all Macintosh computers, the Macintosh IIsi will run System 7.0, Apple's next major release of the Macintosh operating system.

Both configurations come standard with mouse, microphone, complete documentation, Macintosh System Software, HyperCard 2.0 software, training disks, and a one-year limited warranty. A choice of keyboard and display is offered separately.

Mac IIsi Tech Specs

THE 68030 microprocessor runs at 20 megahertz and features a built-in Memory Management Unit (MMU). The MMU supports the A/UX operating system and provides the capabilities necessary to support virtual memory, a new feature of Macintosh system software version 7.0. Virtual memory lets you work with more applications without the need for large amounts of DRAM by setting up sections on the hard disk for easy memory swapping. There are 256-byte data and instruction caches that accelerate overall system performance by eliminating one wait state that occurs with the 68020 processor.

Customers who work routinely with software such as sophisticated CAD/CAM and graphics applications may want to add the Motorola 68882 floating-point math coprocessor to their systems. The 68882 optimizes the computer's performance during math-intensive calculations.

The Mac IIsi comes with 1 megabyte of RAM on the main logic board. Up to 16 megabytes of RAM can be added by installing Single In'line Memory Modules (SIMMs). Some possible configurations include:

- 2 mb (1 mb on main logic board; four 256K SIMMs)
- 3 mb (1 mb on main logic board; four 512K SIMMs)
- 5 mb (1 mb on main logic board; four 1-megabyte SIMMs)
- 9 mb (1 mb on main logic board; four 2-megabyte SIMMs)
- 17 mb (1 mb on main logic board; four 4-megabyte SIMMs)

The Macintosh IIsi uses 100-nansecond (or faster) fast-paged mode RAM. A ROM SIMM socket on the logic board provides an easy ROM upgrade path. One NuBus card or 030 Direct Slot card can be added to the Macintosh IIsi by connecting it to a Macintosh IIsi adapter card (sold separately). NuBus provides a multiplexed, 32-bit address bus and data bus on a single 96-pin connector. The NuBus architecture supports data transfer rates up to 3.75 megabytes per second. The 030 Direct Slot provides a 32-bit slot directly to the microprocessor via a 120-pin connector. This slot is compatible with expansion cards available for the Macintosh SE/30 personal computer. The Motorola 68882 floating-point math coprocessor is on the adapter cards.

The Mac IIsi provides full ROM support for all AppleTalk protocols, and includes built-in serial ports for LocalTalk network connections.

The Macintosh IIsi has been designed to accept and process sound as well as generate it. Using a microphone or phono jack adapter, and appropriate software, you can speak into the computer to create electronic voice messages and add voice comments to files. Sound entering the computer is monaural, 8-bit sound. It is filtered through a custom filter/preamplifier chip, converted to digital form, and stored in DRAM or directly on the hard disk. An Apple electret microphone and phono jack adapter are included.

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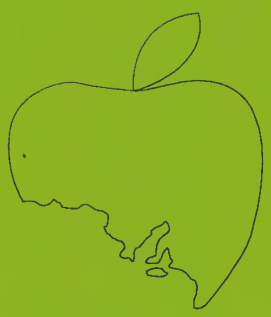
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